Powered Industrial Tr...rai...

Benefits of Training

- *Improved Awareness*
- *Increased Efficiency*
- *Additional Productivity*
- *Reduction of Damaged Goods*
- *OSHA Requirements*

Benefits of Training

- *Using this training can reduce:*
  - *Lift Truck Accidents*
  - *Product Damage*
  - *Maintenance Costs*
  - *Personal Injury*
  - *Property Damage*
  - *Lost Time / Workers Compensation Costs*
  - *Fuel Costs*

Benefits of Training

- *Provides*
  - *A Safe Work Environment*
  - *Increased Production*
  - *Well Trained Employees*
  - *Maximum Return on your Lift Truck Investment*
  - *An answer to OSHA requirements*

Training Program Objectives

- *Understand the principles and hazards of the operation & maintenance of powered industrial trucks (PIT)*
- *Provide materials & information to train and certify PIT operators*
- *Understand the OSHA Standard & revised training requirements for PIT's*

Training Program Elements

- *Discussion of OSHA Standard & revised training requirements*
- *Discussion of PIT design, capacity, stability, and safe operation*
- *Inspection & maintenance of PIT's*
- *Written PIT competency examination*
- *Demonstration of practical training & PIT operation certification*

Training

- *Everyone is a leader.... and everyone is a follower.*
- *We learn from each other.*
- *This session belongs to you.*
- *To get the most out of this session, participate and maximize the use of your class time!*

Training

- ***Training that brings about no change is about as successful as a parachute that opens on the first bounce!!***

Responsibilities

- Employer
  - Training Program
  - Safe Working Environment
  - Right Equipment for the Job
  - Sound, mechanically operable equipment

Responsibilities

- Employee
  - Eliminate Personal Injury
  - Eliminate Product Damage
  - Eliminate Property Damage
  - Reduce Maintenance Costs
  - Provide a safe working environment for fellow employees

Guidelines for Safety are Found:

- *In Company Policy*
- *In OSHA Regulations*
- *In Manufacturers Manuals*

OSHA Standard - 1910.178

- The OSHA standard covers:
  - (a) General requirements (b) Designations
  - (c) Designated locations (d) Conversions
  - (e) Safety guards (f) Fuel handling
  - (g) Batteries (h) Lighting
  - (I) Gases & fumes (j) Dockboards
  - (k) Trucks & rail cars **(l) Training**
  - (m)Truck operations (n) Traveling
  - (o) Loading (p) Operation of truck
  - (q) Maintenance

OSHA Standard - 1910.178

- The OSHA standard is revised with an effective date March 1, 1999. It now mandates amount and type of training required on the following:
  - Operator's prior knowledge and skill;
  - Types of PITs the operator will operate in the workplace;
  - Hazards present in he workplace; and
  - Operator's demonstrated ability to operate a PIT.

29CFR 1910.178(l)

- Safe Operation-Employees must be competent to operate a PIT through a training/evaluation system.
- Prior to operating a PIT- Employer shall ensure each operator has successfully completed training (Exceptions: trainees & duplicative training)

Training Program Implementation 29 CFR 1910.178 (l)

- Trainees may operate:
  - Under the direct supervision of persons who train PIT operators.
  - When there is no operations that may endanger the trainee or other employees.

Training Program Implementation 29 CFR 1910.178 (l)

- Training is a combination format of videos, lectures, discussions and CBT.
- Practical training for trainees would be training demos by the trainer and/or exercises performed by the trainee using the employer's PIT.

Training Program Implementation 29 CFR 1910.178 (l)

- There are 13 truck related topics:

- Operating instructions, warnings & precaution
- Difference between PIT and automobiles
- Controls, instrumentation, locations, working
- Engine or motor operation
- Steering and maneuvering
- Visibility & restrictions due to loads

Training Program Implementation 29 CFR 1910.178 (l)

- There are 13 truck related topics cont:

- Fork attachment adaptation & use
- PIT capacity
- PIT stability
- PIT inspection & maintenance required
- Refueling and/or charging batteries
- Operating limitations
- Operator’s manual warnings for PIT type

Training Program Implementation 29 CFR 1910.178 (l)

- There are 9 workplace-related topics:

- Operating surface conditions
- Composition of loads to be carried and load stability
- Load manipulation of stacking and unstacking
- Pedestrian traffic interface
- Narrow aisles & restricted areas

Training Program Implementation 29 CFR 1910.178 (l)

- There are 9 workplace-related topics continued:

- Hazardous (classified) locations
- Ramps & slopes affecting stability
- Closed environments-poor ventilation
- Unique or potentially hazardous environments

Training Program Implementation 29 CFR 1910.178 (l)

- Refresher Training & evaluation

Refresher training, including an evaluation of the effectiveness of that training, shall be conducted as required by paragraph (l)(4)(ii) to ensure that the operator has the knowledge and skills needed to operate the powered industrial truck safely.

Training Program Implementation 29 CFR 1910.178 (l)

- Refresher Training & evaluation continued.

When to conduct refresher training?

- Operator has been observed operating the PIT in an unsafe manner;
- Operator is involved in an accident or a near-miss incident;
- Operator has been determined during an evaluation to need additional training;

Training Program Implementation 29 CFR 1910.178 (l)

- Refresher Training & evaluation continued.

When to conduct refresher training continued..

- There are changes in the workplace that could affect safe operation of the truck; or
- Operator is assigned to operate a different type of truck.

Training Program Implementation 29 CFR 1910.178 (l)

- Refresher Training & evaluation continued.
  - An evaluation of each power industrial truck operator's performance shall be conducted at least once every three years.
  - Avoid duplicative training. If appropriate training was provided via paragraph (l)(3), additional topic training is not required if the operator is competent to operate his/her PIT safely.

Training Program Implementation 29 CFR 1910.178 (l)

Certification

- Certify each operator has been trained & evaluated
- Certification consists of name of operator, dates of training/evaluation, identity of instructor/evaluator.
- Must meet the OSHA training date deadline

Powered Industrial Trucks

- Hazards associated with powered industrial trucks include
  - vehicle & load instability
  - the weight of the PIT & load
  - maintenance & refueling hazards
- Rollover and loss of load are a primary concern

Powered Industrial Truck Fatal Accident Analysis

- Overturned forklift 24 %
- Struck by materials 17
- Struck by PIT 14
- Fall from PIT 14
- Caught between PIT 11
- PIT ran off dock 8
- Repairs on PIT 6
- Other cause 6

Three P's to Safeguard

- *Personnel*
- *Property*
- *Product*

Forklift Safety

- As this platform moved away from the building during movement, the workers were trying to find out what that buzzing noise was.
- The noise was the tip over alarm!

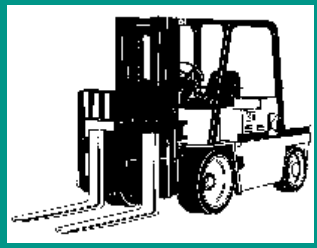
Types of Industrial Trucks

- Counter Balanced
- Narrow Aisle
- Pallet Truck
- Aerial Equipment

Automobiles vs Lift Trucks

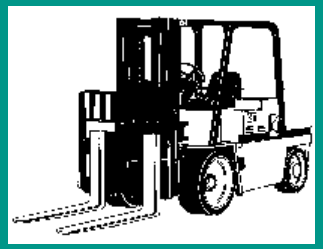
- What's the difference?
  - Weight
  - Visibility
  - Steering
  - Traffic
  - Tires
  - Shifting center of gravity

Ratings on the lift truck



Model Number	Times 100	Rating of truck
25	100	2,500 pounds
50	100	5,000 pounds
100	100	10,000 pounds

Weight of Lift Trucks



Rating	Times 2	Weight
2,500 lbs	X 2	5,000 lbs
5,000 lbs	X 2	10,000 lbs
10,000 lbs	X 2	20,000 lbs

Stability

- PIT stability is a function of:
  - Center of gravity
    - load
    - combined
  - Balance at the fulcrum
  - Dynamic forces
    - traveling, tilting, lowering load
  - Actual PIT capacity versus rated capacity
  - Lateral & longitudinal dimension

Counterbalance

- *Fulcrum:*
  - *The fulcrum is the axis of rotation or pivot point on the PIT*
- *Load Moment:*
  - *Load moment is equal to the weight of the load x the distance of the center of gravity from the fulcrum*

Counterbalance

- Balance:
  - Balance occurs when the moment on each side of the fulcrum is equal.. like a see saw
  - If the moment on the lifting side of the PIT fulcrum is greater than the PIT moment, the PIT will tip over
  - If the moment on the PIT side of the fulcrum is greater than the load moment, the PIT will be stable

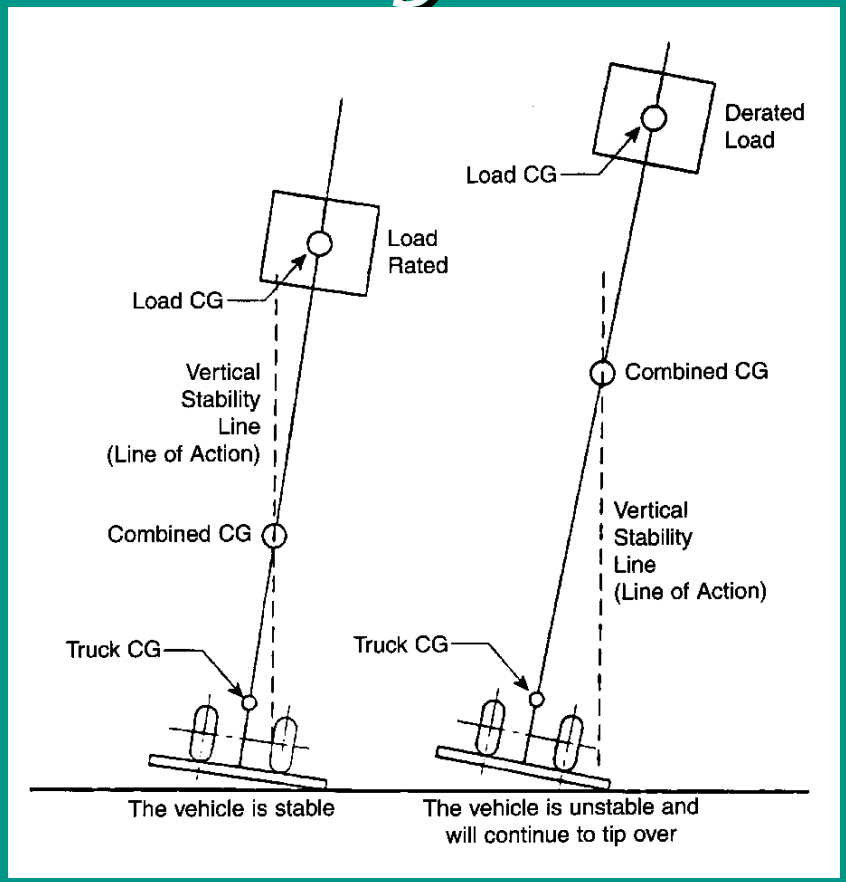
Counterbalance

- *Counterweight:*
  - *The purpose of the counterweight on a PIT is to create a greater moment on the PIT side of the fulcrum than the load side*
  - *In other words… tip the see saw in favor of the fork lift and prevent it from tipping over in the direction of the load*
  - *Never add weight to the counterweight for purposes of lifting a heavier load!*

Center of Gravity

- Center of Gravity:
  - The point of a load at which all of the weight is concentrated
- Combined Center of Gravity
  - The point inside or outside of the stability triangle at which all of the weight of the PIT and load is concentrated

Center of Gravity



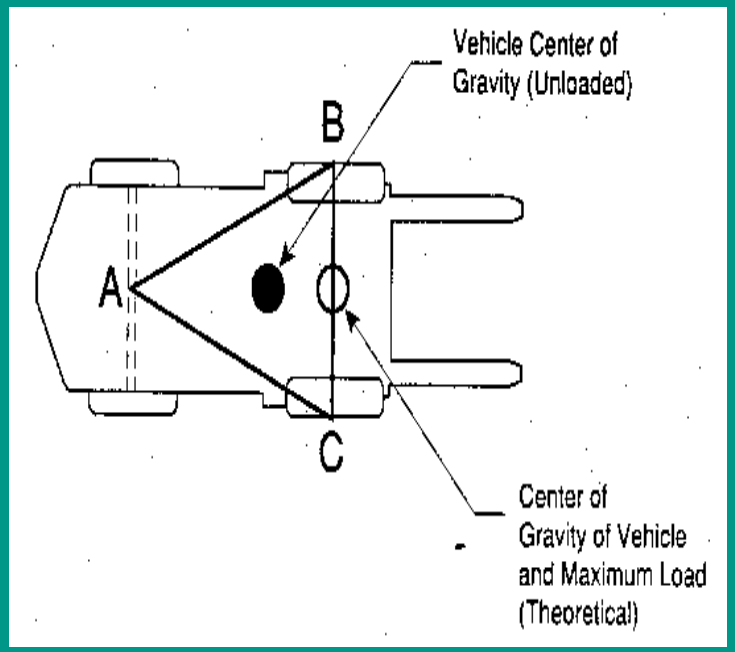
Forklift Safety

- Aerial Lifts are another form of fork lift truck
- Always lower the platform when moving the lift to keep the center of balance low

The Stability Triangle

- The stability triangle is created by connecting all points of support
  - Most four wheel lift trucks have only three points of support since the rear steer axle has a pivot pin in the center
  - As long as the combined center of gravity remains within the stability triangle, the PIT will not tip over

Forklift Safety



- *The Safety Triangle is found on fork lifts when you draw a line from the front tires to the rear tires.*
- *Keep you center of gravity inside this triangle!*

The Stability Triangle

- *Longitudinal Stability:*
  - *Longitudinal stability prevents a PIT from tipping forward, or backward, by keeping the combined center of gravity with the triangle*
  - *Lateral Stability:*
  - *Lateral stability prevents a PIT from tipping to either side by keeping the combined center of gravity within the triangle*

The Stability Triangle

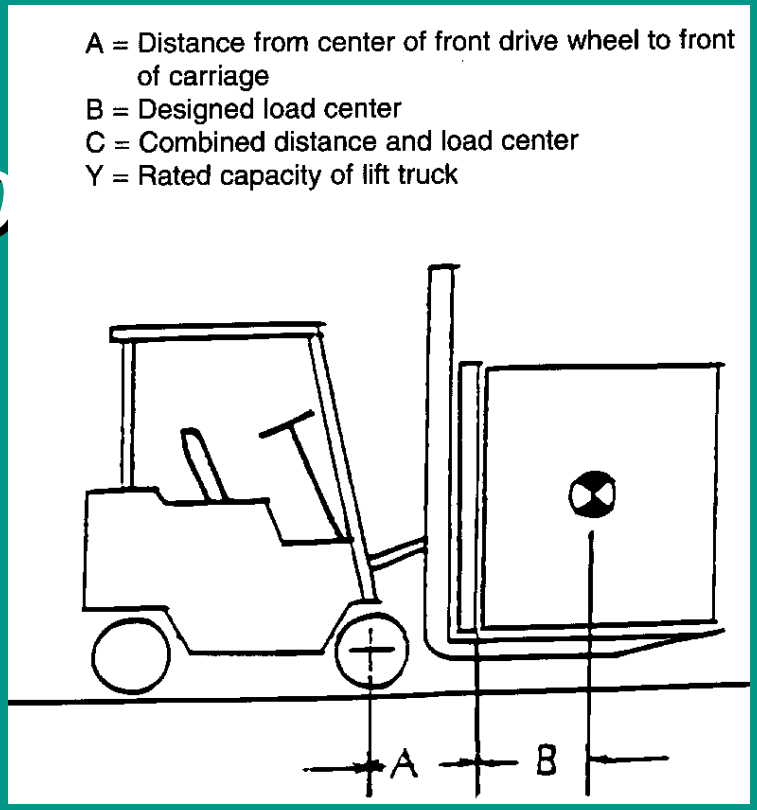
- Dynamic Stability:
  - Dynamic stability prevents a PIT from tipping over because of:
    - acceleration & deceleration
    - cornering or turning of PIT's
    - tilting of the load
    - lowering of the load
    - uneven floor surfaces
  - Stable loads can become unstable as a result of the above forces

The Stability Triangle

- Factors that affect the stability of a PIT and a PIT carrying a load include:
  - Placement of the load on the PIT
  - Height of the load
  - Combined center of gravity of PIT & load
  - Center of gravity of PIT not carrying a load
  - Dynamic forces
  - Operating on inclines
  - Actual capacity of the PIT

Forklift Safety Capacity (Inch pound determination)

- (A +B)= C (Combined Distance Load Center)
- (CxY)= Inchpounds
- (Inchpounds/C)= Extended Load Carrying Capacity!!
- A=18 B=24
- Rated capacity =5,000
- (18+24)= 42 inches
- (42 inches X 5000 lbs)=210,000 inch pounds
- 210,000 inch pounds/42inches = 5,000 … the rated capacity!
- Now, extend the forks out 4 inches!
- 210,000inch pounds/46 inches = 4,545 lbs capacity. You lose 435 pounds capacity!



Forklift Safety

- This operator is keeping his forks close to the ground while negotiating rough terrain.

Forklift Safety

- *He approaches the load squarely, sets the forks beneath the pallet.*

Forklift Safety

- With the forks beneath the pallet, he raises the load slightly.
- Next he tilts the mast back.

Forklift Safety

- He backs away from the truck.
- Next he lowers the load
- (perhaps he could have lowered this load a bit more)

Operation on Ramps & Inclines

- Guidelines for operation on inclines
  - Electric pallet jacks should not be used on inclines exceeding a 7% grade
  - Electric lift trucks typically cannot be used on inclines exceeding a 10% grade
  - Gasoline and LPG lift trucks can typically handle inclines up to a 15% grade
  - The manufacturers information should include grade capabilities

Operation on Ramps & Inclines

- *Proper operation on grades:*
  - *Always ascend or descend an incline or ramp with the "load" end upgrade*
  - *When traveling up or down a ramp with a load, the forks should be pointed up grade*
  - *When traveling up or down a ramp without a load, the forks should be pointed down grade... remember that the counterweight on an empty lift truck is the load*

Operation on Ramps & Inclines

- *If you must ascend a ramp or incline when carrying a load downgrade (10%):*
  - *Tilt the mast as far towards the lift truck as possible to help maintain the center of gravity within the stability triangle*
  - *Travel with the load as close to the ground as possible*
  - *Travel with the load slowly and avoid stopping on the incline*

Forklift Safety

- *Docks*
  - *Ensure dock plates are fastened securely before you travel over them*
  - *All trucks, trailers must have their brakes set and wheels chocked.*
  - *Always make sure the front end of the trailer is supported in some manner!*
- *Parking*
  - *Place forks flat on the floor!*
  - *Place controls in neutral*
  - *Don’t block emergency areas!*
  - *Forklifts are considered unattended if you are more than 25 feet away!*

Forklift Safety

- Backing
  - Always look behind you before you back up.
  - Sound horn to warn employees of your presence, the proceed with caution
- Inclines and Ramps
  - Travel with the load UPHILL
  - Watch for edges of ramps, docks, etc
  - Drive slowly down ramps, allow extra room to stop!

Inspection of Powered Industrial Truck's

- PIT operators must perform a pre-use check of the following:
  - Signals, horns, back up alarms
  - Brakes - all brake systems
  - Clutch & transmission
  - Steering
  - Controls
  - Forks and attachment operation
  - Engine operation

Inspection of Powered Industrial Trucks

- Checklists to be completed by PIT operators ensure that necessary inspections are performed
- Checklists provide the documentation necessary to demonstrate compliance with OSHA
- Conduct inspections prior to and after use.
- Inspect continuously during operation

Hazards of Batteries

- Hazards of batteries include
  - Chemical hazard caused by corrosive sulfuric acid contained in battery
  - Electrical hazard inherent in battery and battery charging
  - Explosive hazard caused by the formation of hydrogen gas during battery charging
  - Hazard of handling the tremendous weight of PIT batteries

Battery Safety & Maintenance

- Battery safety and maintenance items:
  - Use protected areas with spill containment
  - Wear goggles, gloves, and apron when watering or handling batteries
  - Keep spark and flame from batteries when watering and charging
  - Fill battery cells to proper levels to prevent boil over

Battery Safety & Maintenance

- *Emergency eye/face wash and shower facilities must be available*
- *Facilities to contain, neutralize, and clean up spills must be available*
- *Battery acid can be neutralized with soda ash or baking soda*
- *Racks or other material handling equipment must be available when batteries must be removed from equipment*

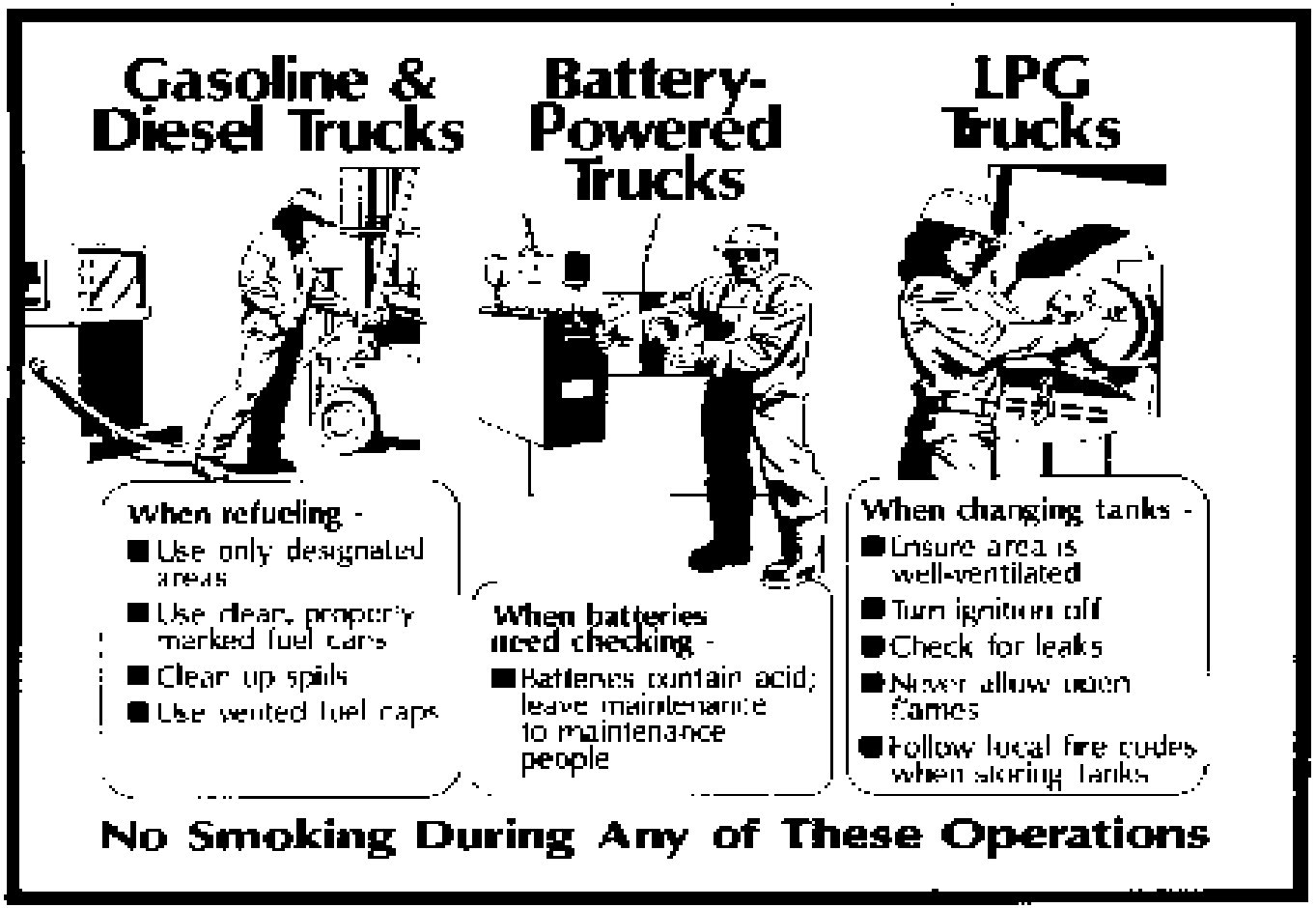
Forklift Safety
Changing LP Gas Tanks

- *Avoid open flames/smoking areas!*
- *Wear protective gloves to avoid freeze burns!*
- *Leave the engine running*
- *Close the tanks valve to use up any fuel in system*
- *When engine stops, turn off ignition*
- *Remove empty tank and store it immediately*
- *Check the new tank for serviceability*
- *Install the new tank on the truck*

Forklift Safety Rules of the Road

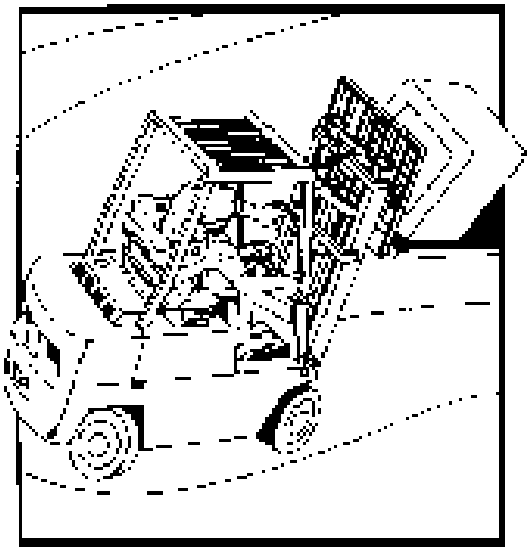
- *Use Safety Equipment- Glasses/seat belts*
- *Watch out for long hair and moving parts!*
- *Keep hands/feet inside the safety cage of the truck*
- *Pedestrians ALWAYS have the right of way!*
- *Never lift or transport coworkers with the forks*
- *Use the horn to warn employees at intersections*
- *Eliminate unsafe situations immediately. Clean up debris.*

Forklift Safety Poster



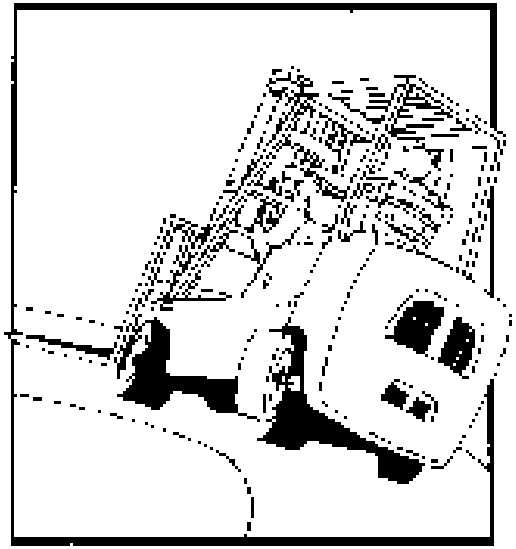
Forklift Safety Poster

Forklift Rollovers



HIGH LOADS

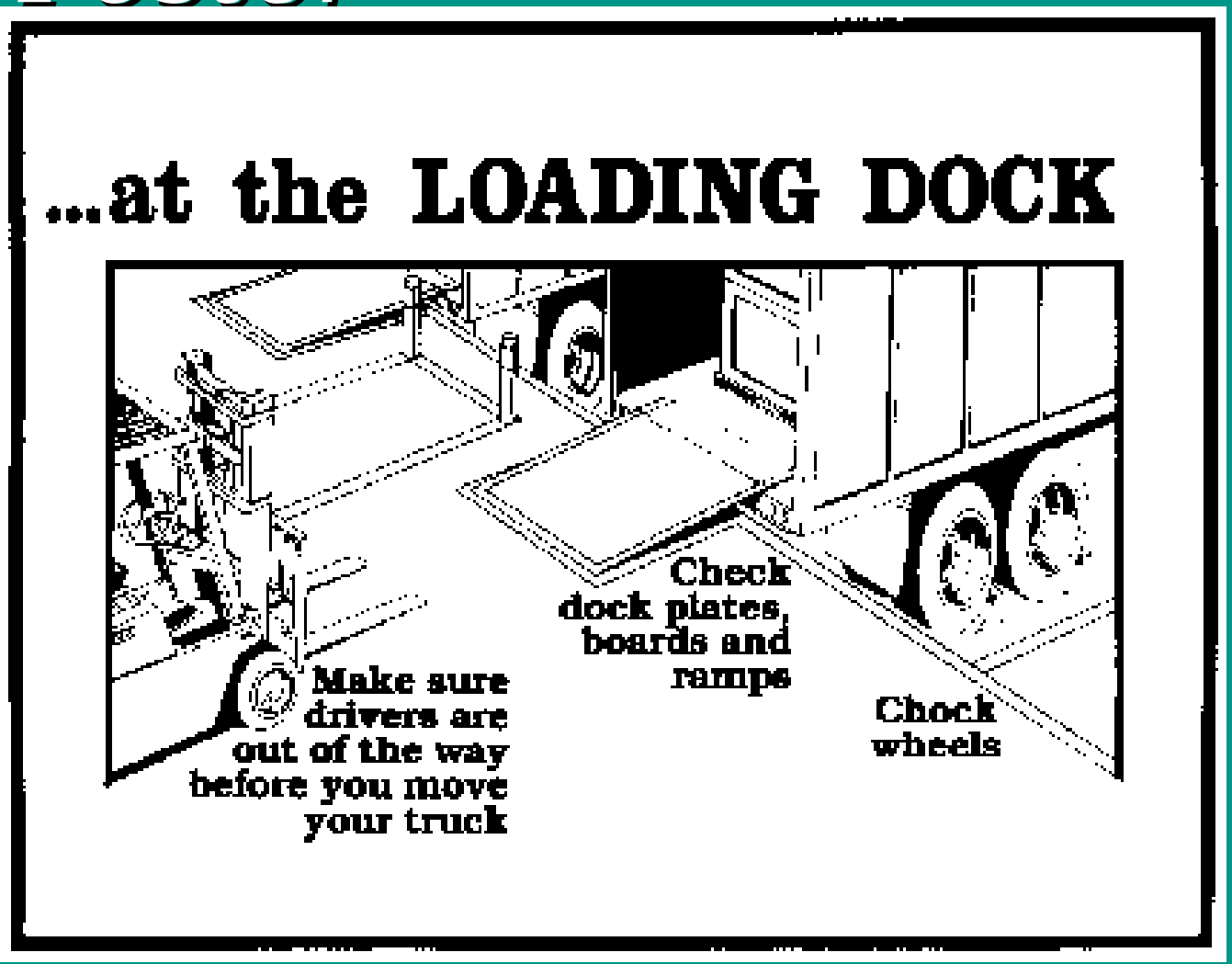
Trucks with raised loads tip over easily in sharp turns - even at slow speeds.



FAST TURNS

Empty trucks tip over easily because they are rear-end heavy.

Forklift Safety Poster



Forklift Safety Poster